MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

DET5068 – ANALOG ELECTRONICS 1

(Diploma in Electronic Engineering)

16 OCTOBER 2019
02:30 PM – 04:30 PM
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This booklet consists of 5 pages including cover pages with 4 questions only.
2. Attempt **ALL** questions given. All questions carry equal marks and distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.
4. All necessary working **MUST** be shown.

QUESTION 1 [25 Marks]

(a) Silicon (atomic number 14) and Germanium (atomic number 32) are two examples of semiconductor.

(i) Why Silicon is widely used in semiconductive field than Germanium? [4 marks]

(ii) Describe the process of doping and explain how it alters the atomic structure of silicon. [3 marks]

(iii) What happens when heat is added to silicon? [2 marks]

(b) With the aid of diagram, describe the effect of forward bias. [11 marks]

(c) Draw the output voltage waveform for the circuit in Figure Q1. Determine the voltage and the current values in the circuit. [5 marks]

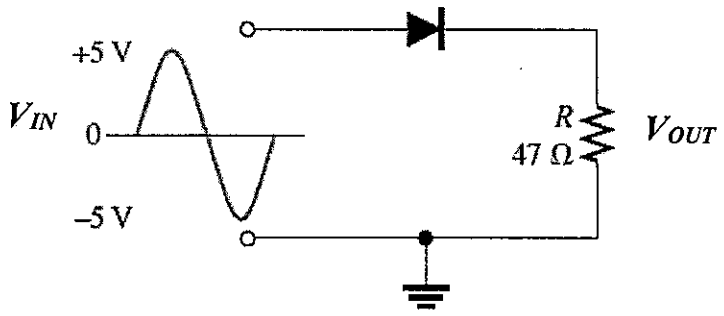

Figure Q1

Continued...

QUESTION 2 [25 Marks]

(a) Explain why a series resistor is necessary when a diode is forward-biased. [2 marks]

(b) Solve the following questions based on the diode configuration given in Figure Q2:

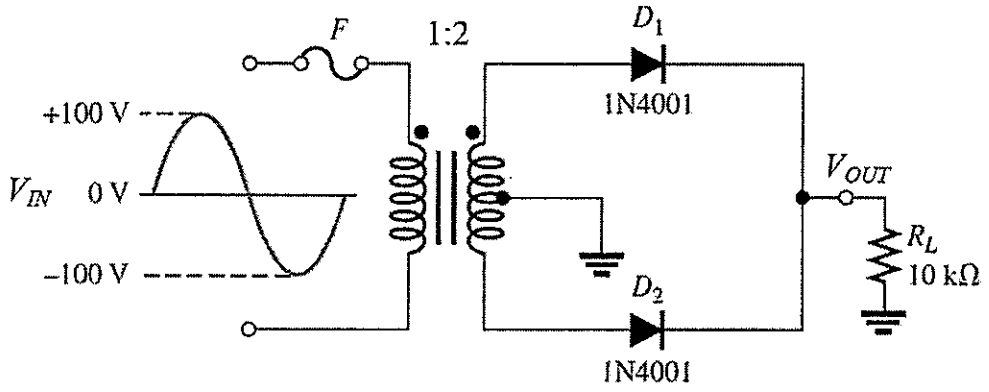

Figure Q2

(i) Describe the transformer type used in the circuit. [2 marks]

(ii) Name and briefly explain the operation of the respective diode application. [6 marks]

(iii) Show the voltage waveforms across each half of the secondary winding and across R_L when a 100 V peak sine wave is applied to the primary winding [8 marks]

(iv) What minimum PIV rating must the diodes have? [2 marks]

(c) Answer the following questions:

(i) When the reverse current in a zener diode increases from 25 mA to 35 mA, the Zener voltage changes from 5.5 V to 5.55 V. What is the impedance of this device? [2 marks]

(ii) A zener has an impedance of 15Ω. What is its terminal voltage at 40 mA if $V_Z = 4.2$ V at $I_Z = 15$ mA? [3 marks]

Continued...

QUESTION 3 [25 Marks]

(a) Referring to Figure Q3(a), determine the minimum value of current gain β required to put the transistor in saturation when, $V_{BE} = 0.7$ V and $V_{CE\,(sat.)} \approx 0.2$ V and $V_{in} = 5$ V. [14 marks]

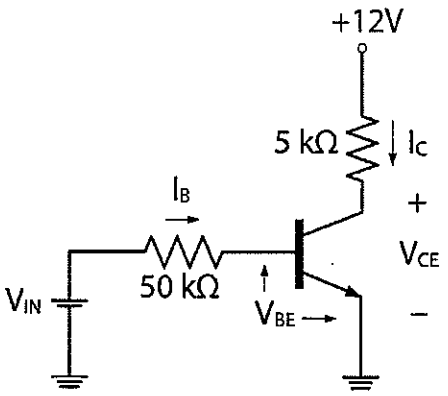

Figure Q3(a)

(b) Find out the operating point current I_{CQ}, and voltage V_{CEQ} in the circuit shown in Figure Q3(b). (Take $V_{BE} = 0.7$ V, $\beta = 200$). [11 marks]

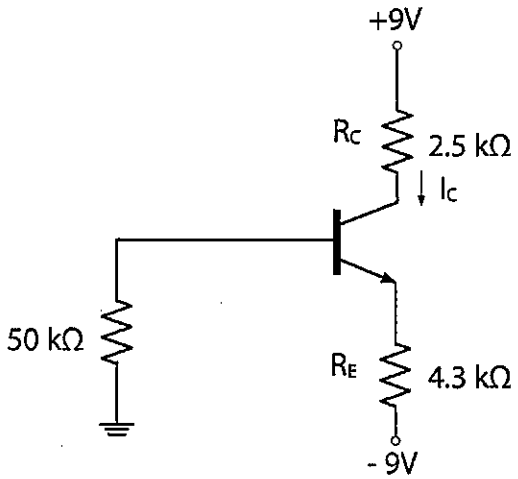

Figure Q3(b)

Continued...

QUESTION 4 [25 Marks]

(a) Find the bias point and the amplifier parameters of the circuit as shown in Figure Q4(a) for Si-BJT. (Take, $\beta = 200$, $V_A = 150$ V). [15 marks]

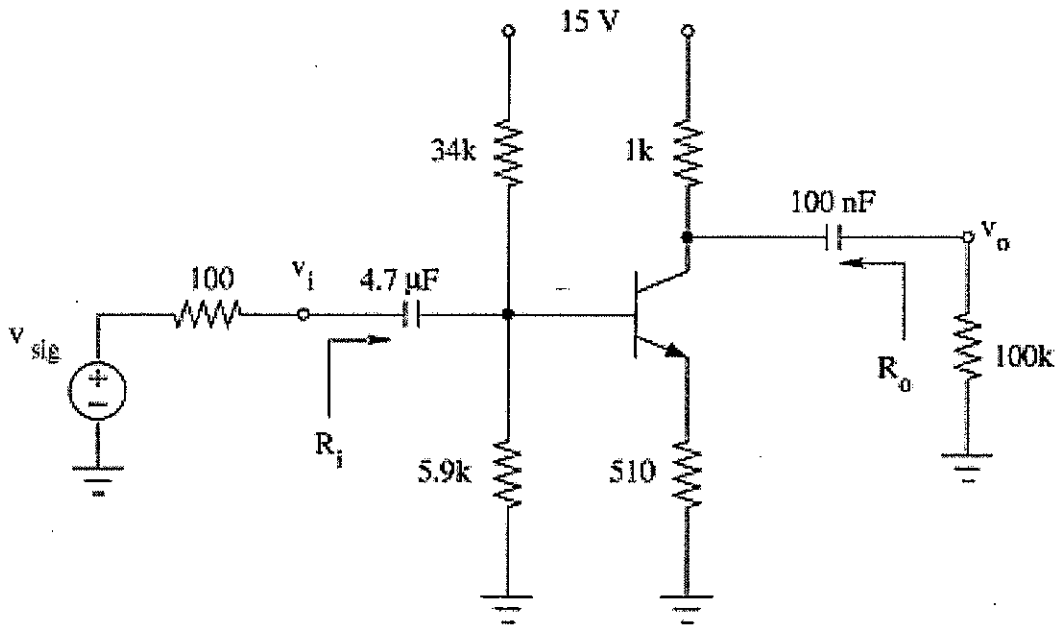

Figure Q4(a)

(b) Draw the AC equivalent circuit of the circuit shown in Figure Q4(b). [10 marks]

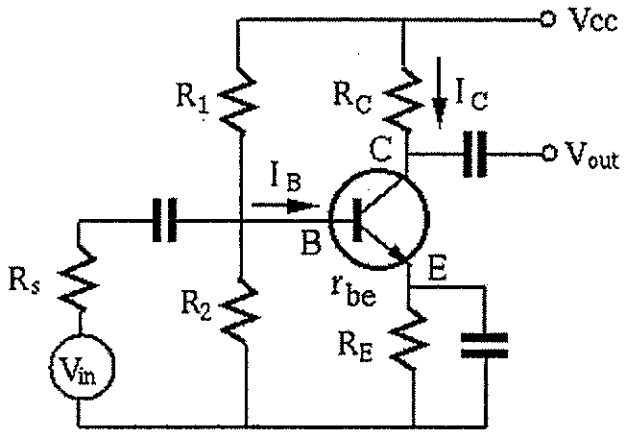

Figure Q4(b)

End of Paper